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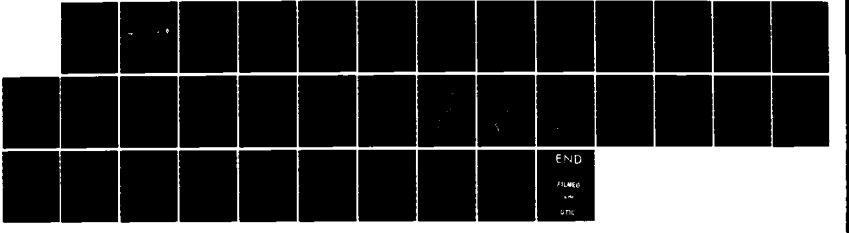

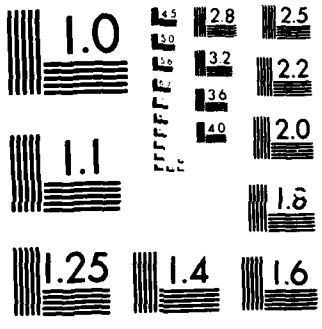

AFWL-TR-85-40

IRESET PROPERTIES TESTS

K.G. Bell
K.W. Havens

New Mexico Engineering Research Institute
University of New Mexico
Albuquerque, New Mexico 87131

December 1985

Final Report

AIR FORCE WEAPONS LABORATORY
Air Force Systems Command
Kirtland Air Force Base, NM 87117-6008

This final report was prepared by the New Mexico Engineering Research Institute, Albuquerque, New Mexico, under Contract F29601-81-C-0013, Job Order 88091379 with the Air Force Weapons Laboratory, Kirtland Air Force Base, New Mexico. Miss Patricia Kearney (NTEDS) was the Laboratory Project Officer-in-Charge.

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Patricia Kearney

PATRICIA KEARNEY
Project Officer

FOR THE COMMANDER

T.D. McCarson Jr.

T.D. McCARSON
Lt Col, USAF
Chief, Technology Branch

Carl L Davidson

CARL L. DAVIDSON
Colonel, USAF
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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

IRESET A-1 and A-1a are castable explosives that hold promise as possible replacements for ammonium nitrate and fuel oil (ANFO) in large charges. This report covers the results of three rate stick tests conducted to determine the detonation characteristics of the IRESET explosives in large-diameter charges.

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I. INTRODUCTION

IRECO Chemicals, Inc., has developed a castable explosive, IRESET, that can be placed by pumping and sets to a hard, water-resistant charge. IRESET can be obtained in a variety of compositions. Two of these, IRESET A-1 and A-1a, hold promise as possible replacements for ammonium nitrate and fuel oil (ANFO) for use in large (544 metric tons [600 tons] or greater) high-explosive tests.

Because IRESET A-1 and A-1a are still in the developmental stage, not much is known about the detonation characteristics of the two compositions when they are used in large charges. Explosive compositions and performance data provided by IRECO are shown in Table 1.

To obtain data on the performance of large-diameter IRESET charges, three rate sticks were fabricated and used to test the explosive. In this report the rate stick design, the test design, the test instrumentation, and the test results are described.

TABLE 1. IRESET COMPOSITION[a] AND PERFORMANCE DATA

Properties	Composition A-1	Composition A-1a
Density, g/cm^3	1.42	1.26
Velocity, m/s	2900 (25.4-cm dia.) 3500 (40.6-cm dia.)	5300 (25-cm dia.) 5800 (40-cm dia.) 6400 (90-cm dia.)
Energy, cal/g	842	842
Compression strength	345 kPa (50 lb/in^2)	<0.013 %/min creep at 731 kPa (106 lb/in^2)
Critical diameter (detonate/fail), cm	25.4/20.3	15
Minimum booster[b] (detonate/fail), g	454/227	170

[a]Ingredients of IRESET are ammonium nitrate, H_2O, and oils.
[b]Values given for Pentolite 50/50.

II. TEST DESIGN

Two rate sticks were designed for use in determining the steady-state detonation velocity of IRESET A-1 and a third for determining the steady-state detonation velocity of IRESET A-1a. The first rate stick was a 457.2-mm (18-in)-diameter, 3.1-m (10-ft)-long steel pipe with a wall thickness of 9.7 mm (0.38 in). The steel pipe provided containment for the charge. The second rate stick was a 609.6-mm (24-in)-diameter sonotube container, which provided minimal containment. The third was a 914.4-mm (36-in)-diameter, 6.1-m (20-ft)-long steel pipe with a wall thickness of 9.7 mm (0.38 in). The container design is shown in Figure 1.

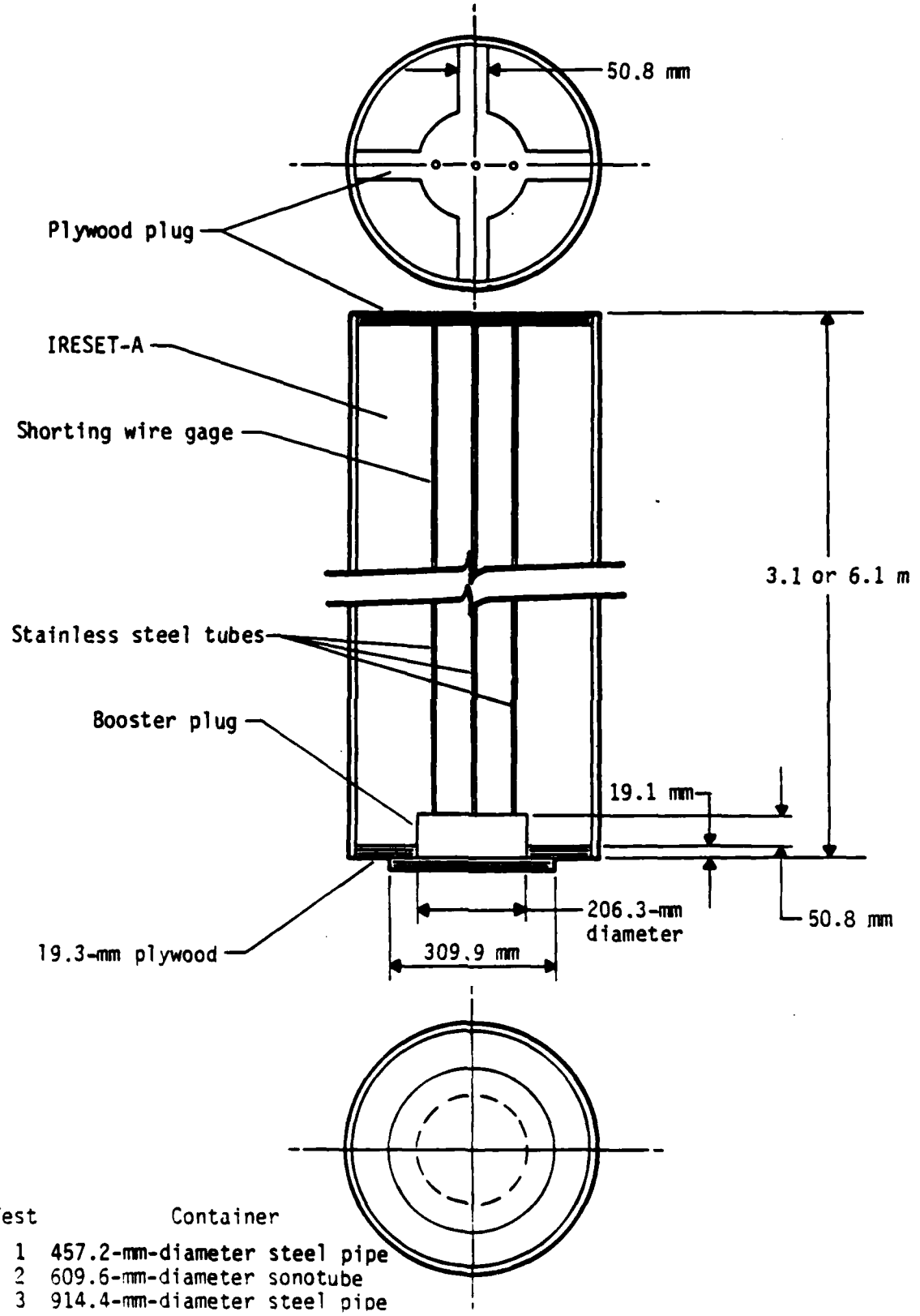
The charge containers were shipped to IRECO to be filled. The IRESET was cast into the containers, and the containers were returned to NMERI for testing.

In the tests, the detonation velocities of the explosives in the three rate sticks were to be measured to determine whether they reached steady-state. The instrumentation used to measure the velocity in the first two rate sticks was identical. Three lines of gages, each line containing 29 shorting pins and a resistance probe, were used in each charge. The gages were enclosed in stainless steel pipes that ran the length of the charge.

The shorting pins were spaced 25.4 mm (1 in) apart in the interval 0 to 0.31 m (0 to 1 ft) from the bottom of the detonator well; 50.8 mm (2 in) apart in the interval 0.31 to 0.61 m (1 to 2 ft) from the bottom; 102 mm (4 in) apart from 0.61 to 0.91 m (2 to 3 ft); 152.4 mm (6 in) apart from 0.91 to 1.22 m (3 to 4 ft); and 304.8 mm (12 in) apart from 1.22 to 3 m (4 to 10 ft). This pin arrangement provided a high definition of the early-time environment.

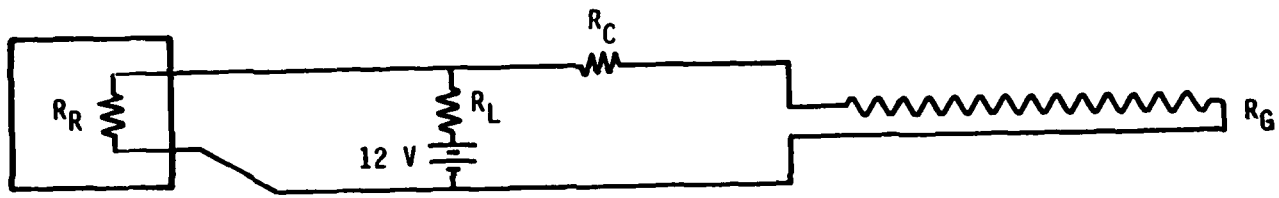
The resistance probes were of the type that provides a continuous record of the velocity. The design of the resistance probe is shown in Figure 2.

The instrumentation for the third rate stick was different from that used on the first two in that only shorting pins were used to measure the velocity. Five lines of gages, each line containing either 37 or 42 shorting pins, were used in the third charge. The gages were enclosed in thin-walled stainless steel tubing, which ran the length of the charge.



Test	Container
1	457.2-mm-diameter steel pipe
2	609.6-mm-diameter sonotube
3	914.4-mm-diameter steel pipe

Figure 1. Rate stick configuration.



R_R = 20 kΩ R_C = 42.1 Ω
R_L = 1.5 kΩ R_G = 35.4 Ω

Figure 2. Resistance probe.

The snorting pin spacing for the third rate stick is shown in Table 2. This pin arrangement provided a high definition of the early- and late-time environments.

To contain the blast and the shrapnel, the first two rate sticks were placed in pits approximately 3 m (10 ft) deep and covered with a soil overburden. The third rate stick was placed in a pit approximately 6 m (20 ft) deep and covered with a soil overburden. A cast booster, 203.2 mm (8 in) in diameter and 50.8 mm (2 in) thick, ignited in seven places, was used to detonate each charge.

TABLE 2. RATE STICK 3, PIN LOCATIONS

Pin Number	Gage range, mm (in)				
	A	B	C	D	E
1	0	0	0	0	0
2	76.2 (3)	25.4 (1)	50.8 (2)	76.2 (3)	304.8 (12)
3	152.4 (6)	101.6 (4)	127.0 (5)	152.4 (6)	609.6 (24)
4	228.6 (9)	177.8 (7)	203.2 (8)	228.6 (9)	914.4 (36)
5	304.8 (12)	254.0 (10)	279.4 (11)	304.8 (12)	1219.2 (48)
6	381.0 (15)	304.8 (12)	304.8 (12)	381.0 (15)	1524.0 (60)
7	457.2 (18)	330.2 (13)	355.6 (14)	457.2 (18)	1828.8 (72)
8	533.4 (21)	406.4 (16)	431.8 (17)	533.4 (21)	2133.6 (84)
9	609.6 (24)	482.6 (19)	508.0 (20)	609.6 (24)	2438.4 (96)
10	685.8 (27)	558.8 (22)	584.2 (23)	685.8 (27)	2743.2 (108)
11	762.0 (30)	609.6 (24)	609.6 (24)	762.0 (30)	3048.0 (120)
12	838.2 (33)	635.0 (25)	660.4 (26)	838.2 (33)	3352.8 (132)
13	914.4 (36)	711.2 (28)	736.6 (29)	914.4 (36)	3657.6 (144)
14	1066.8 (42)	787.4 (31)	812.8 (32)	1066.8 (42)	3810.0 (150)
15	1219.2 (48)	863.6 (34)	889.0 (35)	1219.2 (48)	3962.4 (156)
16	1371.6 (54)	914.4 (36)	914.4 (36)	1371.6 (54)	4114.8 (162)
17	1524.0 (60)	965.2 (38)	1016.0 (40)	1524.0 (60)	4267.2 (168)
18	1676.4 (66)	1117.6 (44)	1168.4 (46)	1676.4 (66)	4419.6 (174)
19	1828.8 (72)	1219.2 (48)	1219.2 (48)	1828.8 (72)	4572.0 (180)
20	2133.6 (84)	1270.0 (50)	1320.8 (52)	2133.6 (84)	4673.6 (184)
21	2438.4 (96)	1422.4 (56)	1473.2 (58)	2438.4 (96)	4775.2 (188)
22	2743.2 (108)	1524.0 (60)	1524.0 (60)	2743.2 (108)	4876.8 (192)
23	3048.0 (120)	1574.8 (62)	1625.6 (64)	3048.0 (120)	4878.4 (196)
24	3200.4 (126)	1727.2 (68)	1778.0 (70)	3352.8 (132)	5080.0 (200)
25	3352.8 (132)	1828.8 (72)	1828.8 (72)	3505.2 (138)	5181.6 (204)
26	3657.6 (144)	1930.4 (76)	2032.0 (80)	3657.6 (144)	5257.8 (207)
27	3810.0 (150)	2133.6 (84)	2133.6 (84)	3962.4 (156)	5334.0 (210)
28	3962.4 (156)	2235.2 (88)	2336.8 (92)	4114.8 (162)	5410.2 (213)
29	4267.2 (168)	2438.4 (96)	2438.4 (96)	4267.2 (168)	5486.4 (216)
30	4419.6 (174)	2540.0 (100)	2641.6 (104)	4572.0 (180)	5562.6 (219)
31	4572.0 (180)	2743.2 (108)	2743.2 (108)	4724.4 (186)	5638.8 (222)
32	4876.8 (192)	2844.8 (112)	2946.4 (116)	4876.8 (192)	5689.6 (224)
33	5029.2 (198)	3048.0 (120)	3048.0 (120)	5181.6 (204)	5740.4 (226)
34	5181.6 (204)	3352.8 (132)	3352.8 (132)	5334.0 (210)	5791.2 (228)
35	5486.4 (216)	3657.6 (144)	3657.6 (144)	5486.4 (216)	5842.0 (230)
36	5638.8 (222)	3962.4 (156)	3962.4 (156)	5791.2 (228)	5892.8 (232)
37	5791.2 (228)	4267.2 (168)	4267.2 (168)	5943.6 (234)	5943.6 (234)
38	---	4572.0 (180)	4572.0 (180)	---	---
39	---	4876.8 (192)	4876.8 (192)	---	---
40	---	5181.6 (204)	5181.6 (204)	---	---
41	---	5486.4 (216)	5486.4 (216)	---	---
42	---	5791.2 (228)	5791.2 (228)	---	---

Note: Each line contained either 37 or 42 shorting pins.

III. TEST RESULTS

The pin box and the Time-of-Arrival Data System I (TOADS I) were used to record the shorting pin data for Test 1. The resistance probe data were recorded on analog tape. Data recovery from this test was poor in that the TOADS I did not receive the proper signal from the shorting pins. The trigger voltage was provided by an external circuit, and because of the shorting pin configuration (common ground), this circuit gave a negative pulse to the TOADS. Data were obtained, however, from the pin box and the resistance probes.

For Test 2 the external trigger circuit was modified for use with common ground shorting pins. The pin box and TOADS I and II were used to record the data. Data recovery from all three systems was good. The resistance probes were recorded on an analog tape.

The data from the resistance probes used on Tests 1 and 2 were not legible. Apparently the capacitance of the long lines caused an early-time voltage rise, and the result was a nonlinear circuit response.

The shorting pin data for Test 3 were recorded on TOADS II and TOADS III. Data recovery from both systems was good.

The TOA plots with all the data available for Tests 1, 2, and 3 are shown in Figures 3, 4, and 5, respectively. The raw data traces are shown in Appendix A and the tabulated TOA data in Appendix B.

Figure 6 is a displacement-versus-time plot for Tests 1 and 2. This plot shows that the detonation velocity was higher in the unconfined than in the confined rate stick. In neither test was the steady-state velocity reached.

A displacement-versus-time plot for Test 3 is shown in Figure 7. This plot shows that the detonation wave reached a steady-state velocity of 6,455 m/s (21,170 ft/s) within 2.43 m (8 ft) and continued at that velocity for the remainder of the test.

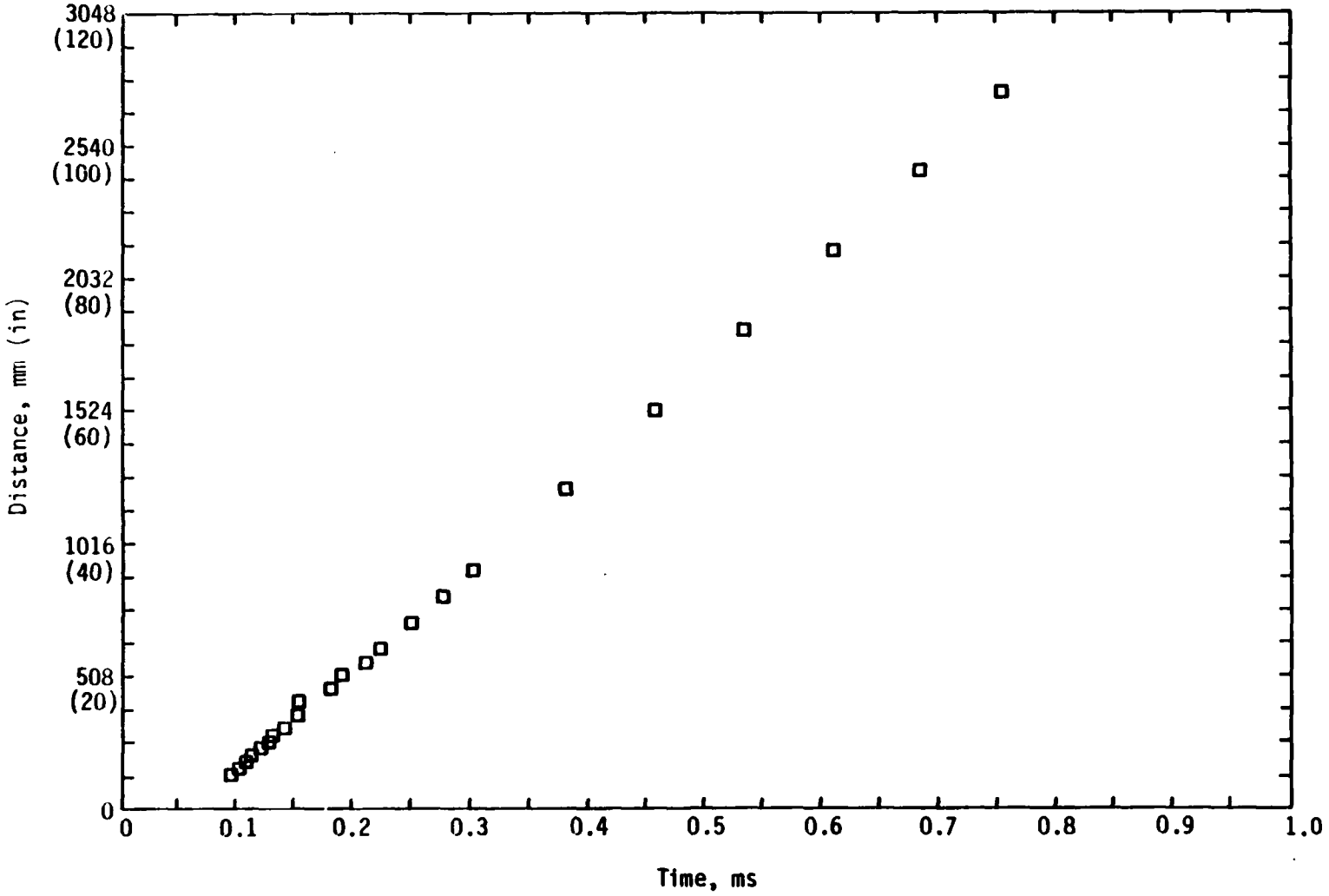


Figure 3. Time-of-arrival plot for Test 1.

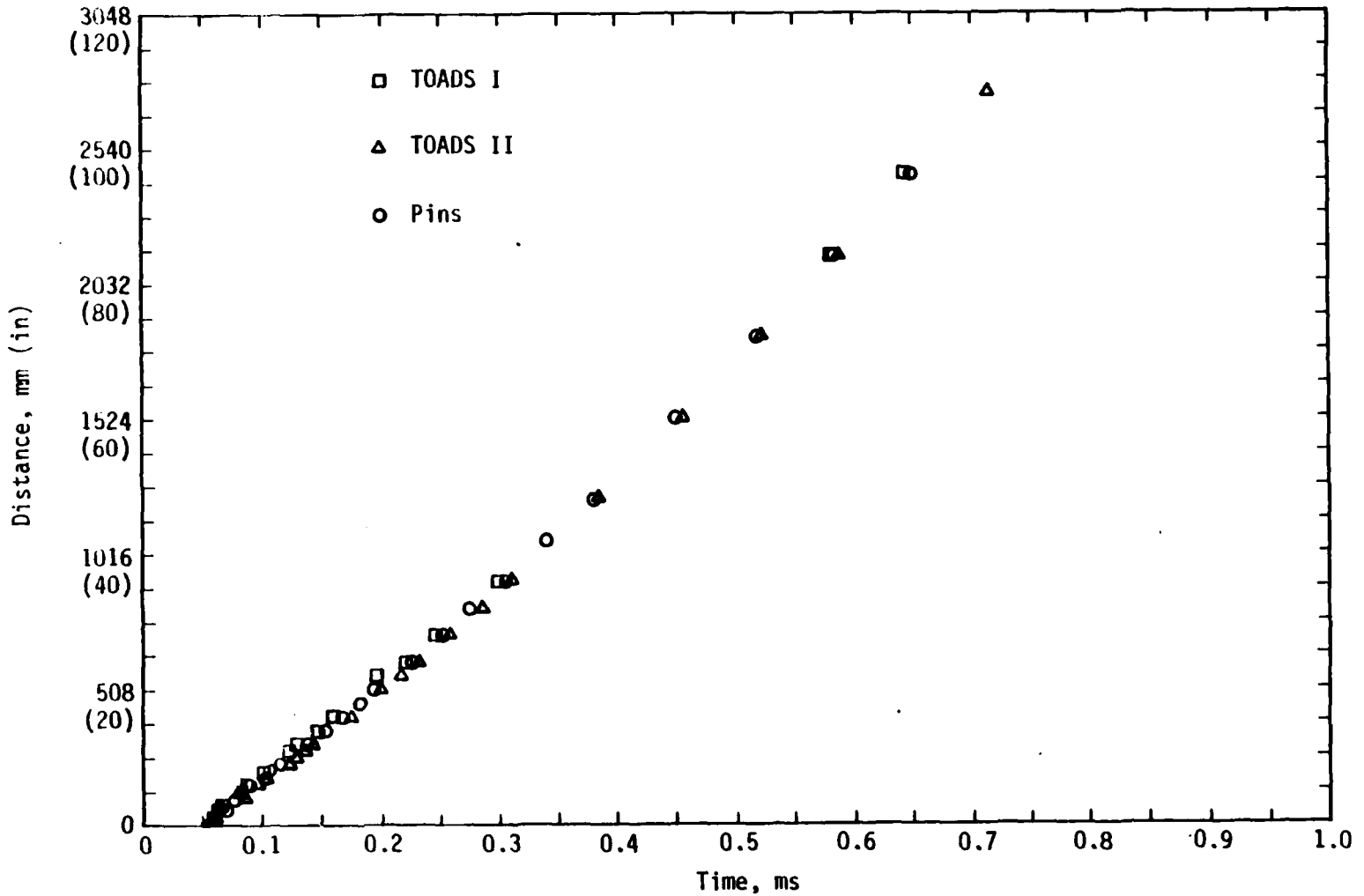


Figure 4. Time-of-arrival plot for Test 2.

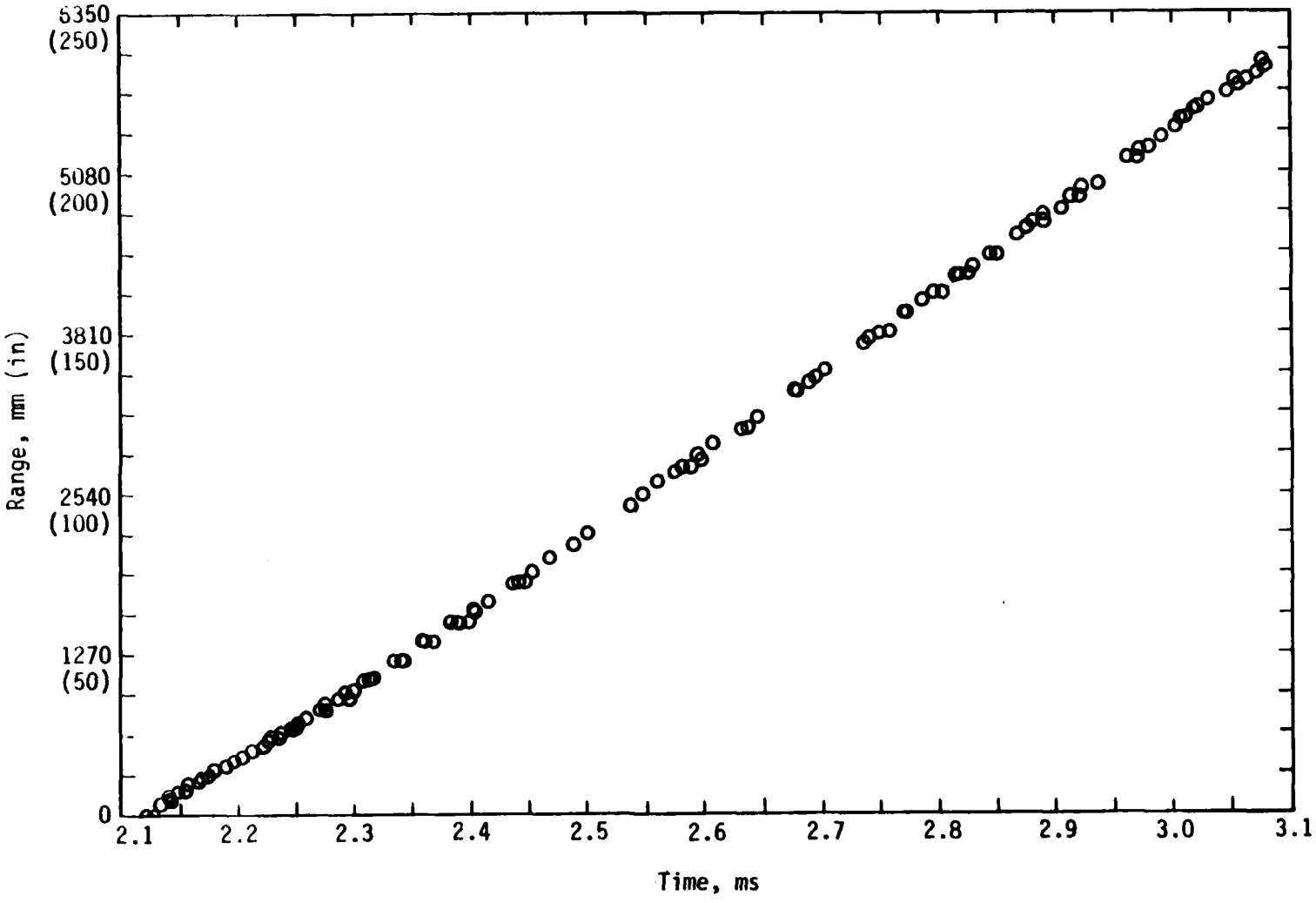


Figure 5. Time-of-arrival plot for Test 3.

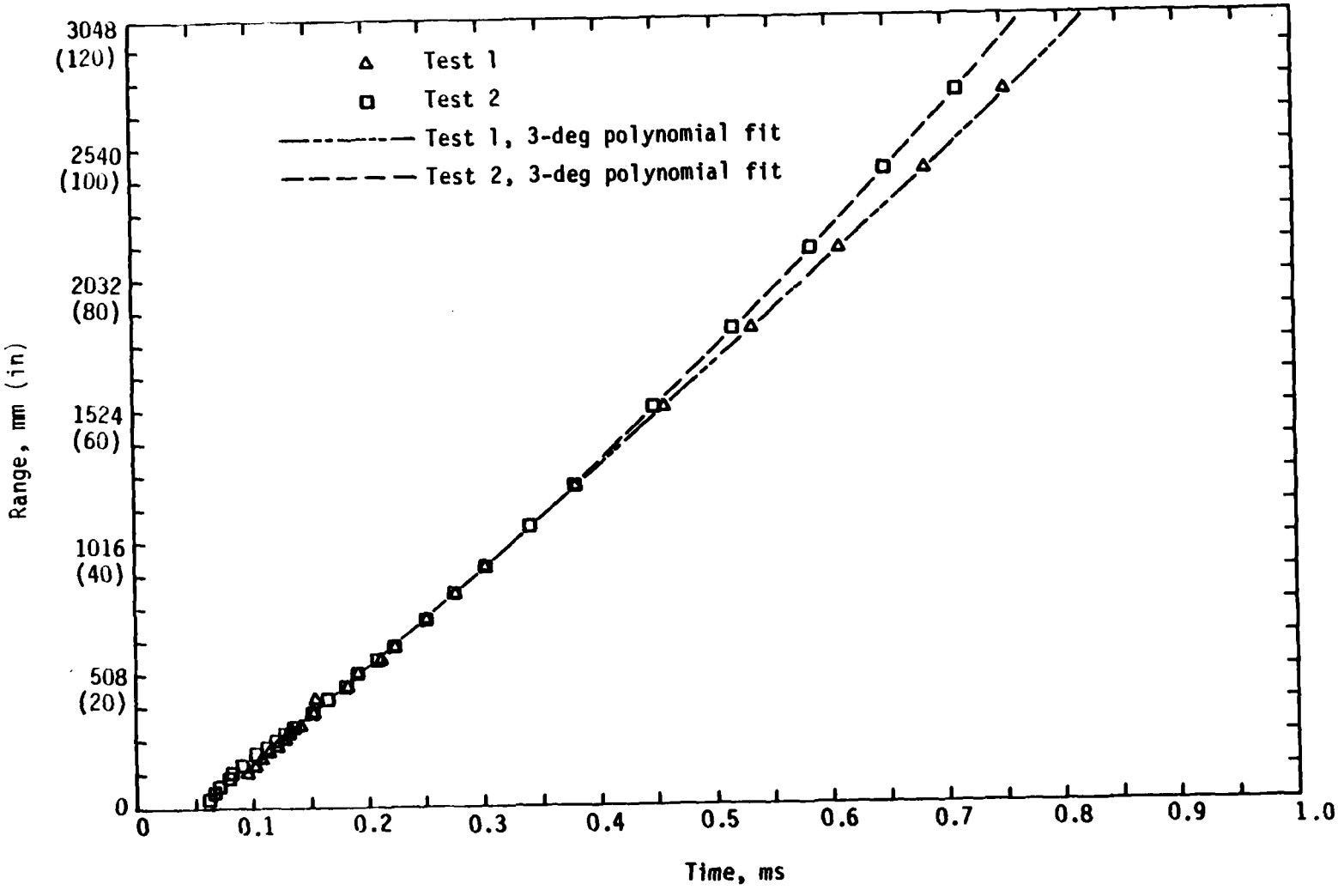


Figure 6. Displacement versus time for Tests 1 and 2.

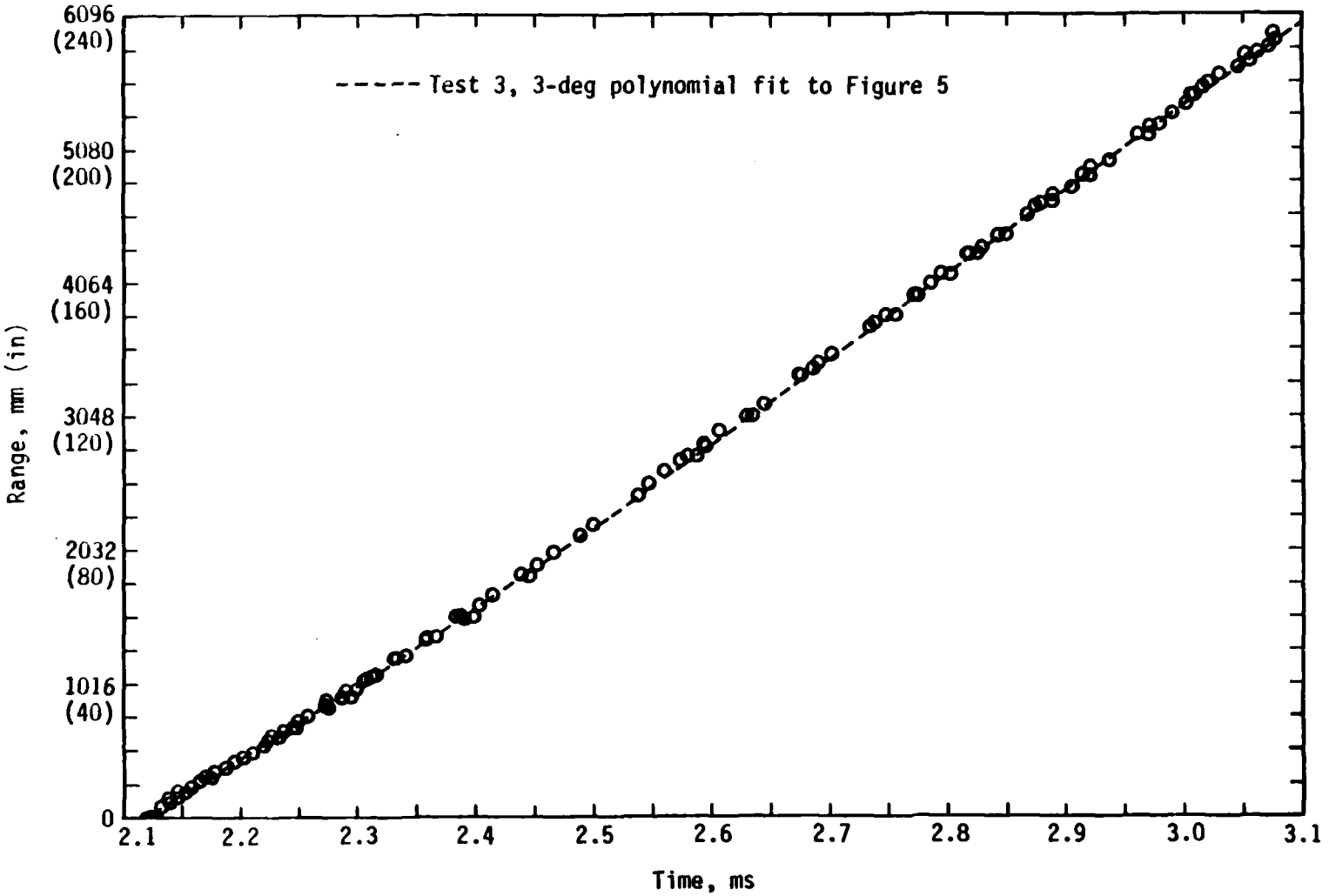


Figure 7. Displacement versus time for Test 3.

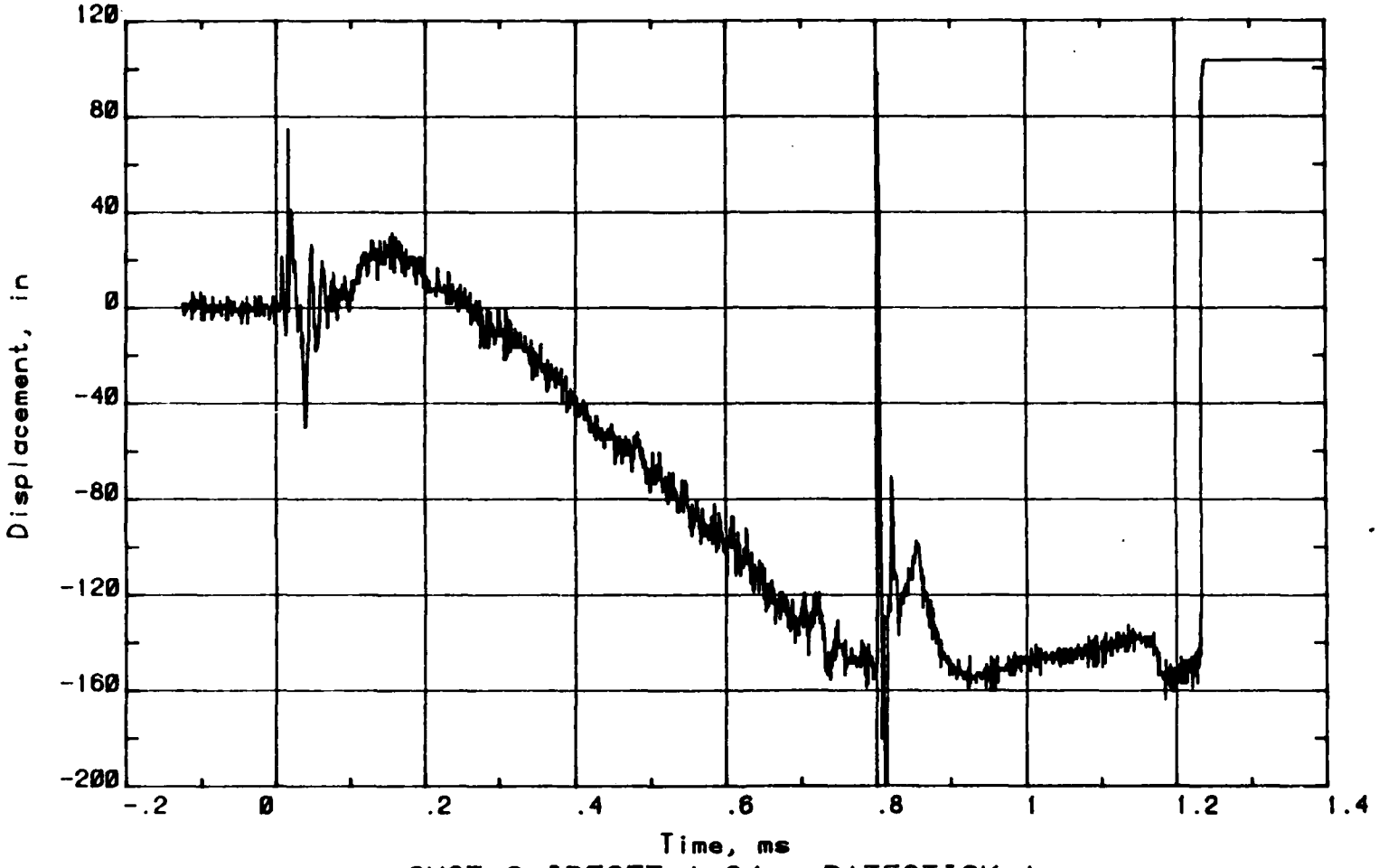
IV. CONCLUSIONS AND RECOMMENDATIONS

The test results show that the detonation velocity of the unconfined charge employed in Test 2 was greater than that of the confined charge used in Test 1. The difference in velocities is due to the much larger diameter of the unconfined charge. However, neither rate stick reached a steady-state velocity as indicated by the slopes of the displacement history curves for Tests 1 and 2 (Fig. 6), which were still increasing when the detonation front reached the end of the charge. The conclusion is that the rate sticks used in Tests 1 and 2 were not long enough to allow the detonation waves to reach steady-state velocity.

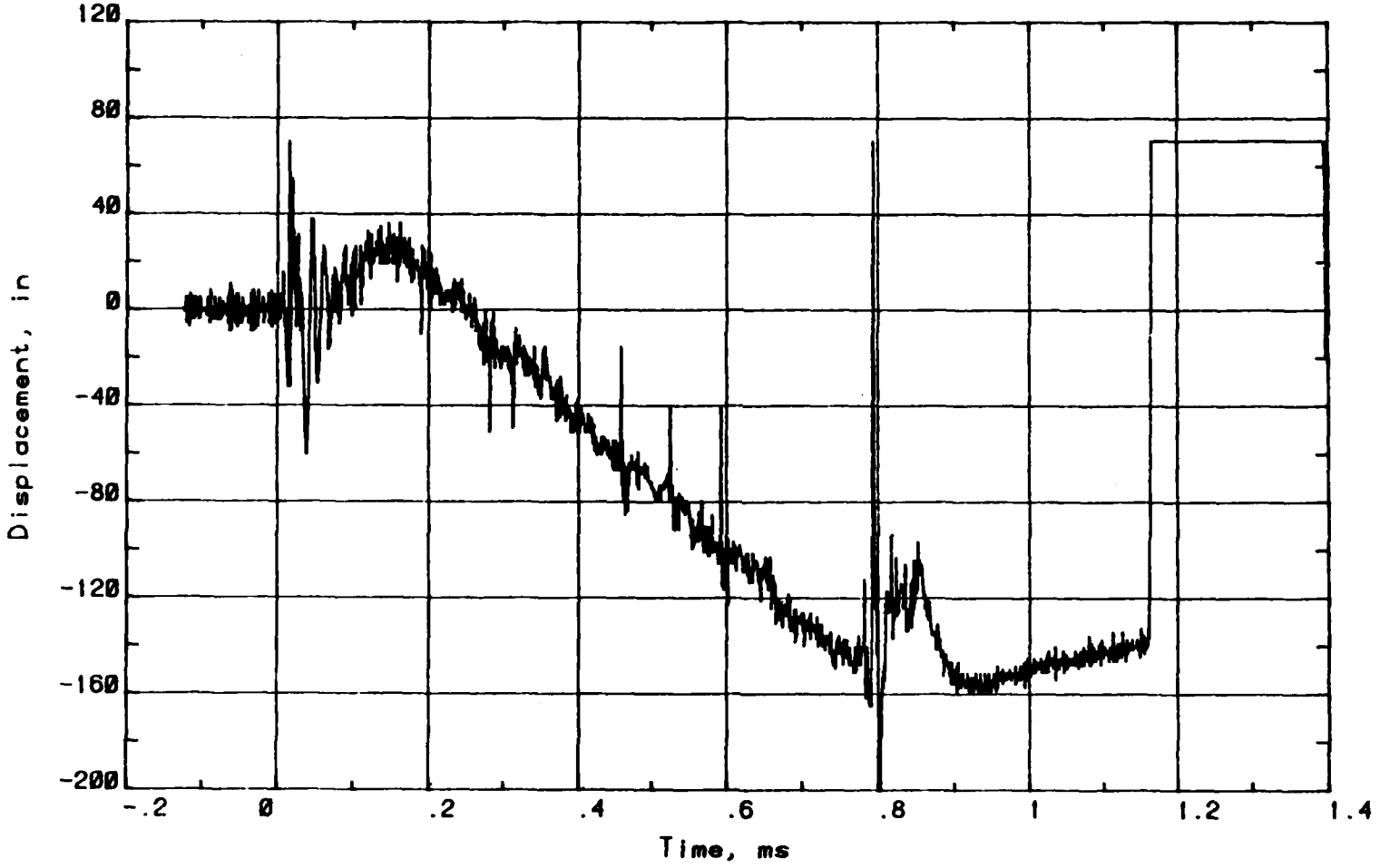
In Test 3, steady-state velocity was obtained in a confined environment as indicated by Figure 7. The rate stick used in Test 3 was twice as long as that used in Test 1. The diameter of the charge was also increased for this test so that more information could be obtained on the detonation characteristics of large charges of IRESET.

On the basis of the results of Test 3, it appears that IRESET warrants additional investigation. IRESET A-1a is potentially useful for large explosive tests when an explosive material that can be cast into a form is required. Because IRESET hardens after casting, the form could be removed before the explosive was detonated. The wave deformities generated by the support containers required for currently used explosives would thus be eliminated.

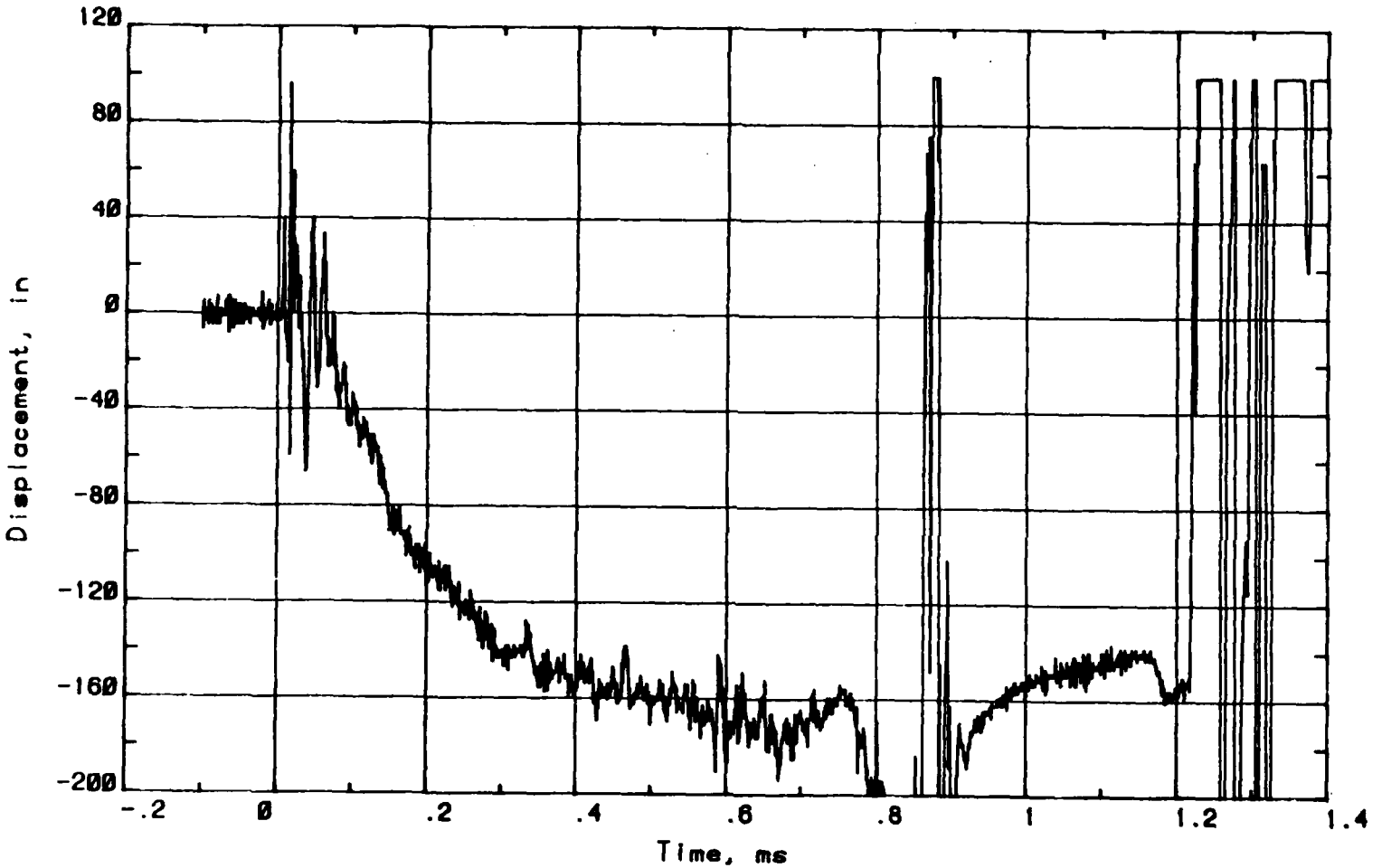
APPENDIX A
RESISTANCE PROBE DATA



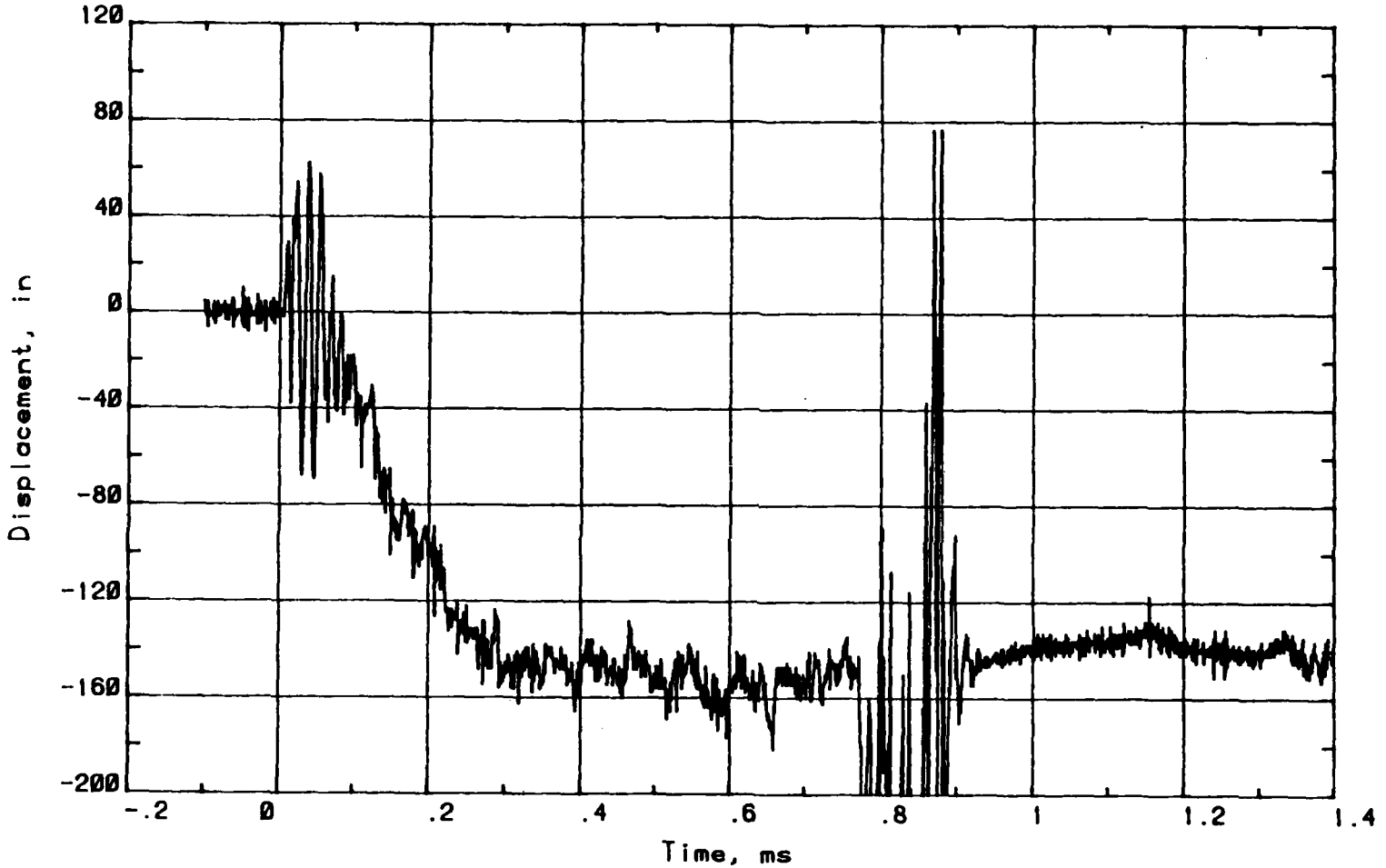
SHOT 2 IRESET-A 24in RATESTICK 1



SHOT 2 IRESET-A 24in RATESTICK 2



SHOT 2 IRESET-A 24in RATESTICK 3



SHOT 2 IRESET-A 24in RATESTICK 4

APPENDIX B
TABULATED TOA DATA

Shot 1 Pin Data
IRESET-A, 18-in, R (in) vs. T (ms):

1	X=	0.0100000	Y=	0.0000000
2	X=	0.0102000	Y=	1.0000000
3	X=	0.0102000	Y=	2.0000000
4	X=	0.0102000	Y=	3.0000000
5	X=	0.0095000	Y=	4.0000000
6	X=	0.0966000	Y=	5.0000000
7	X=	0.1032000	Y=	6.0000000
8	X=	0.1092000	Y=	7.0000000
9	X=	0.1146000	Y=	8.0000000
10	X=	0.1220000	Y=	9.0000000
11	X=	0.1296000	Y=	10.0000000
12	X=	0.1320000	Y=	11.0000000
13	X=	0.1424000	Y=	12.0000000
14	X=	0.1540000	Y=	14.0000000
15	X=	0.1550000	Y=	16.0000000
16	X=	0.1820000	Y=	18.0000000
17	X=	0.1924000	Y=	20.0000000
18	X=	0.2118000	Y=	22.0000000
19	X=	0.2242000	Y=	24.0000000
20	X=	0.2510000	Y=	28.0000000
21	X=	0.2772000	Y=	32.0000000
22	X=	0.3032000	Y=	36.0000000
23	X=	0.3806000	Y=	48.0000000
24	X=	0.4580000	Y=	60.0000000
25	X=	0.5336000	Y=	72.0000000
26	X=	0.6106000	Y=	84.0000000
27	X=	0.6840000	Y=	96.0000000
28	X=	0.7534000	Y=	108.0000000
29	X=	0.8300000	Y=	120.0000000

Shot 2, TOADS I Data
IRESET-A, 24-in, R (in) vs. T (ms):

1	X=	0.0593000	Y=	0.0000000
2	X=	0.0614000	Y=	1.0000000
3	X=	0.0642000	Y=	2.0000000
4	X=	0.0674000	Y=	3.0000000
5	X=	0.0814000	Y=	5.0000000
6	X=	0.0876000	Y=	6.0000000
7	X=	0.1004000	Y=	8.0000000
8	X=	0.1205000	Y=	11.0000000
9	X=	0.1281000	Y=	12.0000000
10	X=	0.1462000	Y=	14.0000000
11	X=	0.1581000	Y=	16.0000000
12	X=	0.1952000	Y=	22.0000000
13	X=	0.2203000	Y=	24.0000000
14	X=	0.2457000	Y=	28.0000000
15	X=	0.2909000	Y=	36.0000000
16	X=	0.5792000	Y=	84.0000000
17	X=	0.6443000	Y=	96.0000000
18	X=	0.7759000	Y=	120.0000000

Shot 2, TOADS II Data
IRESET-A, 24-in, R (in) vs. T (ms):

1	X=	0.0587000	Y=	0.0000000
2	X=	0.0621000	Y=	1.0000000
3	X=	0.0659000	Y=	2.0000000
4	X=	0.0709000	Y=	3.0000000
5	X=	0.0867000	Y=	4.0000000
6	X=	0.0793000	Y=	5.0000000
7	X=	0.0953000	Y=	6.0000000
8	X=	0.1037000	Y=	7.0000000
9	X=	0.1217000	Y=	9.0000000
10	X=	0.1289000	Y=	10.0000000
11	X=	0.1353000	Y=	11.0000000
12	X=	0.1433000	Y=	12.0000000
13	X=	0.1741000	Y=	16.0000000
14	X=	0.1993000	Y=	20.0000000
15	X=	0.2169000	Y=	22.0000000
16	X=	0.2325000	Y=	24.0000000
17	X=	0.2591000	Y=	28.0000000
18	X=	0.2867000	Y=	32.0000000
19	X=	0.3125000	Y=	36.0000000
20	X=	0.3859000	Y=	48.0000000
21	X=	0.4557000	Y=	60.0000000
22	X=	0.5233000	Y=	72.0000000
23	X=	0.5895000	Y=	84.0000000
24	X=	0.7161000	Y=	108.0000000
25	X=	0.7673000	Y=	120.0000000

Shot 2, Pin Box Data
IRESET-A, 24-in, R (in) vs. T (ms):

1	X=	0.0608000	Y=	0.0000000
2	X=	0.0660000	Y=	1.0000000
3	X=	0.0700000	Y=	2.0000000
4	X=	0.0800000	Y=	4.0000000
5	X=	0.0852000	Y=	5.0000000
6	X=	0.0906000	Y=	6.0000000
7	X=	0.1030000	Y=	7.0000000
8	X=	0.1024000	Y=	8.0000000
9	X=	0.1138000	Y=	9.0000000
10	X=	0.1294000	Y=	11.0000000
11	X=	0.1384000	Y=	12.0000000
12	X=	0.1532000	Y=	14.0000000
13	X=	0.1668000	Y=	16.0000000
14	X=	0.1826000	Y=	18.0000000
15	X=	0.1938000	Y=	20.0000000
16	X=	0.2276000	Y=	24.0000000
17	X=	0.2546000	Y=	28.0000000
18	X=	0.2752000	Y=	32.0000000
19	X=	0.3064000	Y=	36.0000000
20	X=	0.3414000	Y=	42.0000000
21	X=	0.3808000	Y=	48.0000000
22	X=	0.4516000	Y=	60.0000000
23	X=	0.5182000	Y=	72.0000000
24	X=	0.5860000	Y=	84.0000000
25	X=	0.6506000	Y=	96.0000000
26	X=	0.7755000	Y=	120.0000000

Shot 2 Averaged Data
IRESET-A, 24-in, R (in) vs. T (ms):

1	X=	0.0599000	Y=	0.0000000
2	X=	0.0638750	Y=	1.0000000
3	X=	0.0675250	Y=	2.0000000
4	X=	0.0720750	Y=	3.0000000
5	X=	0.0802750	Y=	4.0000000
6	X=	0.0827750	Y=	5.0000000
7	X=	0.0910250	Y=	6.0000000
8	X=	0.1009250	Y=	7.0000000
9	X=	0.1044750	Y=	8.0000000
10	X=	0.1141000	Y=	9.0000000
11	X=	0.1214750	Y=	10.0000000
12	X=	0.1286500	Y=	11.0000000
13	X=	0.1370500	Y=	12.0000000
14	X=	0.1528250	Y=	14.0000000
15	X=	0.1664500	Y=	16.0000000
16	X=	0.1805917	Y=	18.0000000
17	X=	0.1924333	Y=	20.0000000
18	X=	0.2083750	Y=	22.0000000
19	X=	0.2270000	Y=	24.0000000
20	X=	0.2535000	Y=	28.0000000
21	X=	0.2773500	Y=	32.0000000
22	X=	0.3060500	Y=	36.0000000
23	X=	0.3414844	Y=	42.0000000
24	X=	0.3791188	Y=	48.0000000
25	X=	0.4494875	Y=	60.0000000
26	X=	0.5172063	Y=	72.0000000
27	X=	0.5851750	Y=	84.0000000
28	X=	0.6495750	Y=	96.0000000
29	X=	0.7130750	Y=	108.0000000
30	X=	0.7735500	Y=	120.0000000

Shot 3 Gage A Data
IRESET-A, 36-in, R (in) vs. T (ms):

1	X=	2.1239000	Y=	0.0000000
2	X=	2.1395000	Y=	6.0000000
3	X=	2.1699000	Y=	12.0000000
4	X=	2.2029000	Y=	18.0000000
5	X=	2.2281000	Y=	24.0000000
6	X=	2.2453000	Y=	27.0000000
7	X=	2.2583000	Y=	30.0000000
8	X=	2.2713000	Y=	33.0000000
9	X=	2.3079000	Y=	42.0000000
10	X=	2.3387000	Y=	48.0000000
11	X=	2.3595000	Y=	54.0000000
12	X=	2.3829000	Y=	60.0000000
13	X=	2.4139000	Y=	66.0000000
14	X=	2.4367000	Y=	72.0000000
15	X=	2.4883000	Y=	84.0000000
16	X=	2.5363000	Y=	96.0000000
17	X=	2.5815000	Y=	108.0000000
18	X=	2.6315000	Y=	120.0000000
19	X=	2.6781000	Y=	132.0000000
20	X=	2.7485000	Y=	150.0000000
21	X=	2.7731000	Y=	156.0000000
22	X=	2.8159000	Y=	168.0000000
23	X=	2.8443000	Y=	174.0000000
24	X=	2.8675000	Y=	180.0000000
25	X=	2.9141000	Y=	192.0000000
26	X=	3.0081000	Y=	216.0000000
27	X=	3.0309000	Y=	222.0000000
28	X=	3.0541000	Y=	228.0000000

Shot 3 Gage B Data
IRESET-A, 36-in, R (in) vs. T (ms):

1	X=	2.1323000	Y=	3.5000000
2	X=	2.1479000	Y=	7.4999600
3	X=	2.1647000	Y=	10.4999600
4	X=	2.1775000	Y=	13.4999600
5	X=	2.1941000	Y=	16.4999600
6	X=	2.2095000	Y=	19.4999600
7	X=	2.2241000	Y=	22.4999600
8	X=	2.2349000	Y=	25.4999600
9	X=	2.2467000	Y=	27.5000000
10	X=	2.2503000	Y=	28.4999600
11	X=	2.2733000	Y=	34.4999600
12	X=	2.3065000	Y=	41.4999200
13	X=	2.3323000	Y=	47.4999200
14	X=	2.3575000	Y=	53.4999200
15	X=	2.3883000	Y=	59.4999200
16	X=	2.4015000	Y=	63.5000000
17	X=	2.4517000	Y=	75.5000000
18	X=	2.4663000	Y=	79.4999600
19	X=	2.4989000	Y=	87.5000000
20	X=	2.5459000	Y=	99.5000000
21	X=	2.5591000	Y=	103.4999600
22	X=	2.5937000	Y=	111.5000000
23	X=	2.6057000	Y=	115.4999600
24	X=	2.6439000	Y=	123.5000000
25	X=	2.6911000	Y=	135.5000000
26	X=	2.7379000	Y=	147.5000000
27	X=	2.7851000	Y=	159.5000000
28	X=	2.8797000	Y=	183.5000000
29	X=	3.0219000	Y=	219.5000000

Shot 3 Gage C Data
IRESET-A, 36-in, R (in) vs. T (ms):

1	X=	2.1403000	Y=	1.9999200
2	X=	2.1527000	Y=	4.9999200
3	X=	2.2107000	Y=	16.9999200
4	X=	2.2231000	Y=	19.9999200
5	X=	2.2459000	Y=	24.0000000
6	X=	2.2901000	Y=	34.9999200
7	X=	2.2975000	Y=	36.0000000
8	X=	2.3139000	Y=	39.9999600
9	X=	2.4023000	Y=	60.0000000
10	X=	2.4133000	Y=	63.9999600
11	X=	2.4403000	Y=	69.9999600
12	X=	2.5733000	Y=	103.9999200
13	X=	2.5947000	Y=	108.0000000
14	X=	2.6877000	Y=	132.0000000
15	X=	2.7341000	Y=	144.0000000
16	X=	2.8285000	Y=	168.0000000
17	X=	2.8755000	Y=	180.0000000
18	X=	2.9219000	Y=	192.0000000
19	X=	2.9717000	Y=	204.0000000
20	X=	3.0173000	Y=	216.0000000

Shot 3 Gage D Data
IRESET-A, 36-in, R (in) vs. T (ms):

1	X=	2.1283000	Y=	0.0000000
2	X=	2.1319000	Y=	3.0000000
3	X=	2.1445000	Y=	6.0000000
4	X=	2.1561000	Y=	9.0000000
5	X=	2.1743000	Y=	12.0000000
6	X=	2.1877000	Y=	15.0000000
7	X=	2.2031000	Y=	18.0000000
8	X=	2.2193000	Y=	21.0000000
9	X=	2.2333000	Y=	24.0000000
10	X=	2.2479000	Y=	27.0000000
11	X=	2.2751000	Y=	33.0000000
12	X=	2.2861000	Y=	36.0000000
13	X=	2.3109000	Y=	42.0000000
14	X=	2.3395000	Y=	48.0000000
15	X=	2.3661000	Y=	54.0000000
16	X=	2.3899000	Y=	60.0000000
17	X=	2.6753000	Y=	132.0000000
18	X=	2.7009000	Y=	138.0000000
19	X=	2.7711000	Y=	156.0000000
20	X=	2.7959000	Y=	162.0000000
21	X=	2.8181000	Y=	168.0000000
22	X=	2.8667000	Y=	180.0000000
23	X=	2.8897000	Y=	186.0000000
24	X=	2.9137000	Y=	192.0000000
25	X=	2.9607000	Y=	204.0000000
26	X=	3.0531000	Y=	228.0000000
27	X=	3.0761000	Y=	234.0000000

Shot 3 Gage E Data
IRESET-A, 36-in, R (in) vs. T (ms):

1	X=	2.1205000	Y=	0.0000000
2	X=	2.2945000	Y=	36.0000000
3	X=	2.3977000	Y=	60.0000000
4	X=	2.4455000	Y=	72.0000000
5	X=	2.5867000	Y=	108.0000000
6	X=	2.6351000	Y=	120.0000000
7	X=	2.7561000	Y=	150.0000000
8	X=	2.8019000	Y=	162.0000000
9	X=	2.8251000	Y=	168.0000000
10	X=	2.8493000	Y=	174.0000000
11	X=	2.8891000	Y=	183.9999600
12	X=	2.9049000	Y=	187.9999200
13	X=	2.9205000	Y=	192.0000000
14	X=	2.9371000	Y=	195.9999600
15	X=	2.9699000	Y=	204.0000000
16	X=	2.9795000	Y=	207.0000000
17	X=	2.9899000	Y=	210.0000000
18	X=	3.0025000	Y=	213.0000000
19	X=	3.0107000	Y=	216.0000000
20	X=	3.0467000	Y=	223.9999200
21	X=	3.0557000	Y=	225.9999600
22	X=	3.0623000	Y=	228.0000000
23	X=	3.0719000	Y=	229.9999200
24	X=	3.0783000	Y=	231.9999600

END

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